REMARKS

The Applicants sincerely appreciate the thorough examination of the present application as evidenced by the Final Office Action of November 14, 2006 (the Final Office Action). In particular, the Applicants appreciate the Examiner's indication that:

> the heaters 222 shown in figure 9 of Sandhu et al have a different orientation than do the heaters taught in the current invention. In the present invention, the gas flows across the coiled element, while in Sandhu et al the gas flows through the coiled heater (along the longitudinal axis of the coil). If the claims were amended to recite this difference, they would overcome the rejections based on Sandhu et al. ... Such an amendment would require further search and consideration, and should be filed as part of an RCE.

Final Office Action, page 21. The Applicants have not amended the claims as suggested by the Final Office Action because: (1) the claims are patentable without amendment as discussed below; and (2) the Examiner has indicated that such amendment would require filing a Request for Continued Examination (RCE). The Applicants also appreciate the Examiner's indication that all rejections under 35 U.S.C. Sec. 102 and 35 U.S.C. Sec. 112 have been overcome.

In the following remarks, the Applicants will show that all claims are patentable over the cited art. A Notice of Allowance is thus respectfully requested in due course. For the sake of conciseness, the remarks presented with the Amendment of August 23, 2006, are not repeated herein, but the remarks from the Amendment of August 23, 2006, are incorporated herein.

I. The Ronsse Publication Is Not Prior Art

The Final Office Action states that "Ronsse et al has a filing date of October 27, 1998 and is art." The Applicants respectfully note that U.S. Patent Publication No. 2003/0101938 to Ronsse et al. ("Ronsse") was filed on September 20, 2002, and that Ronsse claims priority as a continuation-in-part (CIP) of U.S. Patent Application No. 09/179,921 filed on October 27, 1998, to Metzner et al. ("Metzner"). Because the present application has a perfected priority date (based on the Korean priority application) before September 20, 2002, Ronsse is not prior art with respect to the present application except with respect to portions of Ronsse that are included in Metzner.

Ronsse clearly includes disclosure that is not prior art with respect to the present application because Ronsse includes disclosure that is not included in Metzner. For example, Ronsse includes at least 7 sheets of drawings not included in Metzner. Accordingly, only portions of Ronsse that are repetitive with respect to Metzner qualify as prior art, and because Metzner is available, there is no need to consider Ronsse with respect to patentability of the present application. In the following remarks, the Applicants will thus not consider Ronsse, because portions of Ronsse that are not included in Metzner are not prior art.

II. Claim 3 Is Patentable

Claim 3 has been rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over U.S. Patent No. 6,352,594 to Cook et al. ("Cook") in view of U.S. Patent No. 6,449,425 to Sandhu *et al.* ("Sandhu"); as being unpatentable over U.S. Patent No. 6,352,593 Brors *et al.* ("Brors") in view of Sandhu; as being unpatentable over U.S. Patent No. 3,603,284 to Garnache ("Garnache") in view of Sandhu; and as being unpatentable over U.S. Patent No. 3,805,736 to Foehring et al. ("Foehring") in view of Sandhu.

As presented in the Amendment of August 23, 2006, Claim 3 recites a deposition system for depositing a layer on a substrate, the deposition system comprising:

> a process chamber;
> a susceptor in the process chamber, the susceptor being configured to receive a substrate for depositing a layer thereon; and
> a showerhead on a side of the process chamber such that a plane defined by a surface of a substrate received on the susceptor extends beyond an edge of the substrate and intersects the showerhead, the showerhead being configured to receive reaction gases and to introduce the reaction gases into the process chamber, the showerhead including a heating element therein for heating reaction gases prior to introducing the reaction gases into the reaction chamber, wherein the showerhead is further configured to spray the reaction gases into the process chamber in parallel with a substrate received on the susceptor wherein the showerhead comprises,
> a housing,
> at least one inlet port through which the reaction gases are received into the showerhead, and
> a spray plate adjacent the process chamber through which reaction gases are introduced into the process chamber,
> wherein the heating element comprises a heating wire in the housing between the inlet port and the spray plate.

Claim 3 is patentable over the cited art for at least the reasons discussed below.

A. Claim 3 Is Patentable Over The Combination Of Cook And Sandhu

The Final Office Action concedes that: "Cook et al differs from the present invention in that Cook does not teach a wire gas heater in the first plenum and connected to a terminal." Final Office Action, page 2. In support of the rejection, the Final Office Action states that:

> Sandhu ... teaches a CVD apparatus that includes: a processing chamber 201; a susceptor 204 for holding a substrate 206; a shower head 210 comprising a housing 342, a spray plate 234, inlet ports 238, 240, and a wire heating element 222 in the housing between the inlet ports and the spray plate. The wire heats and partially ionizes the processing gases prior to entering the processing chamber. (Entire documents, specifically, figures 9-12 and column 8 lines 42-67)
>
> The motivation for adding the gas heater of Sandhu et al to the apparatus of Cook et al is to heat and partially ionize the gas prior to its entry into the processing chamber as taught by Sandhu et al.
>
> Therefore it would have been obvious ... to add the gas heater of Sandhu et al to the apparatus of Cook et al.

Final Office Action, pages 2-3.

As discussed in the Amendment of August 23, 2006, there is no motivation to modify the apparatus of Cook to include the gas heater of Sandhu, and Cook actually teaches away from such a modification. As discussed in portions of Cook cited in the Final Office Action:

> FIG. 7 illustrates a gas injector 78 having a body 80.... Two gas fittings 84, 86 are shown, providing input for reactant gas to gas channels 88, 90. A water channel 92 is shown between the channels 88, 90 for passage of water to cool the injector 78. (Underline added.)

Cook, col. 4, lines 63-65. Cook teaches away from inclusion of heating element 222 coupled to a gas conduit from Sandhu because Cook discusses a system wherein water is used to cool the injector.

The Final Office Action further states that: "The motivation for adding the gas heater of Sandhu et al to the apparatus of Cook et al is to heat and partially ionize the gas prior to its entry into the processing chamber as taught by Sandhu et al." Final Office Action, pages 2-3. The Applicants respectfully submit that the Final Office Action is improperly combining two references to modify the primary Cook reference to provide the opposite of its stated functionality (*i.e.*, cooling the injector 78). Accordingly, the Applicants submit that there is no motivation to combine Cook and Sandhu as suggested by the Final Office Action, and that in fact, Cook teaches away from such a combination. Moreover, it would not be obvious to somehow selectively substitute elements of the Sandhu processing apparatus (where the

wafer 206 is maintained perpendicular to a direction of gas flow) for elements of the Cook deposition apparatus (where the wafer is maintained parallel to a direction of gas flow).

The Final Office Action also states that:

> Sandhu does not require heating the entire gas injector. Cook et al only teaches a water channel to cool the injector. Cook et al provides no teaching or suggestion that the injector or gas cannot be heated, or that the gas is cooled. Thus, neither Sandhu et al nor Cook et al provide any support for Applicant's argument. Furthermore, it is well known in the art to both heat the gas and cool the gas injector. It is common to heat the gas prior to its entry into the chamber to prevent it from condensing and to raise the temperature of the gas to near the dissociation temperature, and to cool the injector. This is done to maintain the temperature of the gas in the proper temperature range. If a gas is too cool it can condense or cause thermal shock to the substrate, and if the gas is too hot it can dissociate and deposit on the injector causing damage to the injector. (See US Patent Application 2003/0101938 A1 to Ronsse et al or US Patent Application 2001/0035127 A1 to Metzner et al.) The injector of Cook et al is cooled to prevent the premature deposition, and thus does not prevent the gas from being heated.

Final Office Action, pages 15-16. For the reasons discussed above, portions of Ronsse not disclosed in Metzner do not constitute prior art with respect to the present application, so the Applicants will only address the disclosure of Metzner.

As noted above, Cook discusses cooling an injector while Sandhu discusses a heating element coupled to a gas conduit. Accordingly, there is no motivation to combine Cook and Sandhu as suggested in the Final Office Action, and Cook and/or Sandhu actually teach away from such a combination. The Applicants further submit that Metzner fails to provide the missing teaching and/or motivation to combine Cook and Sandhu. While the Final Office Action cites Metzner, the Final Office Action does not identify any particular portions of Metzner to support the rejection. After review of Metzner, the Applicants note that Metzner states that:

> [0051] Lid 205 is also provided with a cooling channel 244 which circulates cooling water within that portion of lid 205 in proximity to o-ring 245. Cooling channel 244 allows lid 205 to maintain the temperatures preferred for advantageous heating of showerhead 240 while protecting o-ring 245 from the high temperatures which degrade the sealing qualities of o-ring 245 thereby making o-ring 245 more susceptible to attack by the reactive species generated and supplied to processing region 202 by remote plasma generator 400. (Underline added.)

Metzner, page 5, paragraph [0051]. Metzner thus discusses a cooling channel in a lid to protect an o-ring as opposed to a cooling channel in an injector as discussed in Cook.

Moreover, Metzner does not appear to provide support for the statements in the Final Office Action relating to both heating a gas and cooling a gas injector. Metzner thus fails to provide motivation for the combination of Cook and Sandhu as suggested in the Final Office Action.

Accordingly, the Applicants respectfully submit that the combination of Cook and Sandhu fails to teach or suggest the recitations of Claim 3 and that Claim 3 is thus patentable over the combination of Cook, Sandhu, and Metzner. If Metzner should be maintained as support for any rejection, the Applicants respectfully request that the Examiner identify specific portions of Metzner that are believed to support such maintained rejection.

B. Claim 3 Is Patentable Over The Combination Of Brors And Sandhu

Claim 3 is patentable over the combination of Brors and Sandhu for reasons similar to those discussed above with respect to the rejection based on Cook and Sandhu. The Final Office Action concedes that: "Brors et al differs from the present invention in that Brors et al does not teach a wire gas heater in the first plenum and connected to a terminal." Final Office Action, page 6. In support of the rejection, the Final Office Action states that:

> Sandhu ... teaches a CVD apparatus that includes: a processing chamber 201; a susceptor 204 for holding a substrate 206; a shower head 210 comprising a housing 342, a spray plate 234, inlet ports 238, 240, and a wire heating element 222 in the housing between the inlet ports and the spray plate. The wire heats and partially ionizes the processing gases prior to entering the processing chamber. (Entire documents, specifically, figures 9-12 and column 8 lines 42-67)
>
> The motivation for adding the gas heater of Sandhu et al to the apparatus of Brors et al is to heat and partially ionize the gas prior to its entry into the processing chamber as taught by Sandhu et al.
>
> Therefore it would have been obvious ... to add the gas heater of Sandhu et al to the apparatus of Brors et al.

Final Office Action, page 6.

The Applicants respectfully submit that there is no motivation to modify the apparatus of Brors to include the gas heater of Sandhu, and that Brors actually teaches away from such a modification. As discussed in Brors:

> The flow pattern of the process gases is vital to the formation of uniform layers upon wafers 44.... Referring now to FIG. 30, process gases to be used in depositing layers on wafers 44 are provided via ducts 202 to a mixing chamber 204 which, along with a plurality of gas flow control devices 206 and a water-cooled injection plate 210, is included within gas injection manifold 200. (Underline added.)

Brors, col. 15, lines 45-54. *See also*, Brors, col. 16 lines 28-29 and 57-58. Brors thus teaches away from inclusion of heating element 222 coupled to a gas conduit from Sandhu because Brors discusses "a water-cooled injection plate ... included within gas injection manifold" in a system where the "flow pattern of the process gases is vital...." In response to the Examiner's comment that "the Applicants have misquoted Brors et al to make it seem that the water-cooled injector plate is vital to the gas flow pattern" (Final Office Action, page 17), the Applicants respectfully submit that the quote is correctly taken word for word from Brors. Accordingly, the Applicants maintain that it would not be obvious to selectively combine elements of the showerhead of Sandhu providing vertical gas flow with the injection manifold of Brors providing horizontal gas flow because Brors states that the flow pattern of the process gases is "vital" and the flow patterns of Sandhu and Brors are very different.

The Final Office Action further states that "The motivation for adding the gas heater of Sandhu et al to the apparatus of Brors et al is to heat and partially ionize the gas prior to its entry into the processing chamber as taught by Sandhu et al." Final Office Action, page 6. The Applicants respectfully submit that the Final Office Action is improperly combining two references to modify the primary Brors reference to provide the opposite of its stated functionality (*i.e.*, cooling the injection plate). Accordingly, the Applicants submit that there is no motivation to combine Brors and Sandhu as suggested by the Final Office Action, and that in fact, Brors teaches away from such a combination. Moreover, it would not be obvious to somehow selectively substitute elements of the Sandhu processing apparatus (where the wafer 206 is maintained perpendicular to a direction of gas flow) for elements of the Brors process chamber (where the wafer is maintained parallel to a direction of gas flow).

Regarding the Examiner's comment that "it is well known in the art to both heat the gas and cool the gas injector" (Final Office Action, page 17), the Applicants submit that the Final Office Action fails to provide support for this position as discussed above. In summary, Metzner discusses a cooling channel in a lid to protect an o-ring as opposed to a water cooled injection plate as discussed in Brors. Moreover, Metzner does not appear to provide support for the statements in the Final Office Action relating to both heating a gas and cooling a gas injector. Metzner thus fails to provide motivation for the combination of Brors and Sandhu as suggested in the Final Office Action.

Accordingly, the Applicants respectfully submit that the combination of Brors, Sandhu, and Metzner fails to teach or suggest the recitations of Claim 3 and that Claim 3 is thus patentable over the combination of Brors and Sandhu. If Metzner should be maintained as support for any rejection, the Applicants respectfully request that the Examiner identify specific portions of Metzner that are believed to support such maintained rejection.

C. Claim 3 Is Patentable Over The Combination Of Garnache And Sandhu

Claim 3 is patentable over the combination of Garnache and Sandhu for reasons similar to those discussed above with respect to the rejection based on Cook and Sandhu and the rejection based on Brors and Sandhu. The Final Office Action concedes that: "Garnache differs from the present invention in that Garnache does not teach a wire gas heater in the first plenum and connected to a terminal." Final Office Action, page 9. In support of the rejection, the Final Office Action states that:

> Sandhu ... teaches a CVD apparatus that includes: a processing chamber 201; a susceptor 204 for holding a substrate 206; a shower head 210 comprising a housing 342, a spray plate 234, inlet ports 238, 240, and a wire heating element 222 in the housing between the inlet ports and the spray plate. The wire heats and partially ionizes the processing gases prior to entering the processing chamber. (Entire documents, specifically, figures 9-12 and column 8 lines 42-67)
>
> The motivation for adding the gas heater of Sandhu et al to the apparatus of Garnache is to heat and partially ionize the gas prior to its entry into the processing chamber as taught by Sandhu et al.
>
> Therefore it would have been obvious ... to add the gas heater of Sandhu et al to the apparatus of Garnache.

Final Office Action, page 9.

The Applicants respectfully submit that there is no motivation to modify the apparatus of Garnache to include the gas heater of Sandhu, and that Garnache actually teaches away from such a modification. As discussed in Garnache:

> Also shown is a heat shield 40 which may be mounted on the reaction chamber side of gas distribution baffle 38. The purpose of heat shield 40 is to reflect energy radiated from ... the heated susceptor 28 which may prove harmful to baffle 38.... The plate is constructed such that it ... will effectively prevent the baffle 38 from overheating and perhaps out-gassing or decomposing. (Underline added.)

Garnache, col. 3, lines 28-39. Garnache thus teaches away from inclusion of heating element 222 coupled to a gas conduit from Sandhu because Garnache discusses a heat shield to "prevent the baffle from overheating."

The Final Office Action further states that "The motivation for adding the gas heater of Sandhu et al to the apparatus of Garnache is to heat and partially ionize the gas prior to its entry into the processing chamber as taught by Sandhu et al." Final Office Action, page 9. The Applicants respectfully submit that the Final Office Action is improperly combining two references to modify the primary Garnache reference to provide the opposite of its stated functionality (*i.e.*, reflecting heat away from the baffle so that the baffle does not overheat). Accordingly, the Applicants submit that there is no motivation to combine Garnache and Sandhu as suggested by the Final Office Action, and that in fact, Garnache teaches away from such a combination. Moreover, it would not be obvious to somehow selectively substitute elements of the Sandhu processing apparatus (where the wafer 206 is maintained in a horizontal orientation) for elements of the Garnache vapor deposition apparatus (where the substrates 30 are maintained in a vertical orientation).

The Applicants maintain that it would not be obvious to selectively substitute the gas heater of Sandhu into the gas distribution baffle of Garnache where Garnache is concerned with overheating of the gas distribution baffle. The Applicants further submit that it would not be obvious to selectively substitute elements of Sandhu for elements of Garnache because they are systems with significantly different structures (e.g., Sandhu provides structure for deposition on a horizontal wafer while Garnache provides a structure for deposition on a vertical substrate).

Accordingly, the Applicants respectfully submit that the combination of Garnache and Sandhu fails to teach or suggest the recitations of Claim 3 and that Claim 3 is thus patentable over the combination of Garnache and Sandhu.

D. Claim 3 Is Patentable Over The Combination Of Foehring And Sandhu

Claim 3 is patentable over the combination of Foehring and Sandhu for reasons similar to those discussed above with respect to the rejection based on Cook and Sandhu, the rejection based on Brors and Sandhu, and the rejection based on Garnache and Sandhu. The Final Office Action concedes that: "Foehring et al differs from the present invention in that

Foehring does not teach a wire gas heater in the first plenum and connected to a terminal." Final Office Action, page 11. In support of the rejection, the Final Office Action states that:

> Sandhu ... teaches a CVD apparatus that includes: a processing chamber 201; a susceptor 204 for holding a substrate 206; and a shower head 210 comprising a housing 342, a spray plate 234, inlet ports 238, 240, and a wire heating element 222 in the housing between the inlet ports and the spray plate. The wire heats and partially ionizes the processing gases prior to entering the processing chamber. (Entire documents, specifically, figures 9-12 and column 8 lines 42-67)
>
> The motivation for adding the gas heater of Sandhu et al to the apparatus of Foehring is to heat and partially ionize the gas prior to its entry into the processing chamber as taught by Sandhu et al.
>
> Therefore it would have been obvious ... to add the gas heater of Sandhu et al to the apparatus of Foehring et al.

Final Office Action, page 11.

The Applicants respectfully submit that there is no motivation to modify the apparatus of Foehring to selectively substitute elements of Sandhu into Foehring. As shown in Figures 2 and 3 of Foehring, reactant gas flow is parallel to the surface of the substrate 36, while the reactant gas flow of Sandhu is perpendicular to the surface of wafer 206. As discussed in Foehring:

> Because the reactant gases are passed over the substrate surfaces in laminar flow it is possible to maintain a substantially uniform, and controllable, deposition rate. ... Because turbulent flow is not used, no unpredictable irregularities in the flow pattern can cause irregular deposition rates at different parts of a substrate surface.

Foehring, col. 5, line 62 to col. 6, line 2. Accordingly, it would not be obvious to selectively substitute elements of the apparatus of Sandhu providing perpendicular reactive gas flow into the apparatus of Foehring providing parallel reactive gas flow. The Applicants thus maintain that it would not be obvious to selectively substitute elements of Sandhu for elements of Garnache because they are systems with significantly different structures.

Accordingly, the Applicants respectfully submit that the combination of Foehring and Sandhu fails to teach or suggest the recitations of Claim 3 and that Claim 3 is thus patentable over the combination of Foehring and Sandhu.

E. Allowance Of Independent Claim 3 And Dependent Claims 4-11 Is Respectfully Requested

For at least the reasons discussed above, the Applicants respectfully submit that Claim 3 is patentable over the combination of Sandhu with Cook, Brors, Garnache, Foehring, and/or Metzner. In addition, dependent Claims 4-11 are patentable at least as per the patentability of Claim 3 from which they depend. Allowance of Claims 3-11 is respectfully requested.

III. Claims 12 And 14 Are Patentable

Claims 12 and 14 have been rejected under 35 U.S.C. Sec. 103(a) as being unpatentable over Cook, Sandhu, U.S. Patent No. 5,958,140 to Arami *et al.* ("Arami") and further in view of U.S. Patent No. 6,059,885 to Ohashi et al. ("Ohashi"); as being unpatentable over Brors and Sandhu and further in view of Ohashi; and as being unpatentable over Foehring, Sandhu, and Arami, and further in view of Ohashi. The Applicants respectfully submit that Claims 12 and 14 are patentable over the cited art for at least the reasons discussed below.

Claim 12, for example, recites a deposition system for depositing a layer on a substrate. More particularly, the deposition system includes:

> a process chamber;
>
> a susceptor in the process chamber, the susceptor being configured to receive the substrate for depositing a layer thereon; and
>
> a showerhead on a side of the process chamber such that a plane defined by a surface of the substrate received on the susceptor extends beyond an edge of the substrate and intersects the showerhead, the showerhead being configured to receive reaction gases and to introduce the reaction gases into the process chamber, the showerhead including a heating element therein for heating reaction gases prior to introducing the reaction gases into the reaction chamber;
>
> wherein the showerhead comprises a plurality of plenums therein such that each plenum receives at least one respective reaction gas from a respective gas inlet port such that reaction gases from the plenums are introduced into the process chamber without prior mixing of the reaction gases between plenums within the showerhead wherein the plurality of plenums comprises respective base portions thereof having spray holes therethrough, wherein the respective base portions are co-planar, wherein the first plenum defines a first cavity providing fluid communication between a first gas inlet port and a first plurality of spray holes, wherein the second plenum defines a second cavity providing fluid communication between a second gas inlet port and a second plurality of spray holes, wherein the first and second cavities are separated, and wherein the first plenum has a length perpendicular to the co-planar base portions that is greater than a length of the second plenum perpendicular to the co-planar base portions..

Claims 12 and 14 are patentable over the cited art for at least the reasons discussed below.

A. Claims 12 And 14 Are Patentable Over The Combination Of Cook, Sandhu, Arami, And Ohashi

The Final Office Action concedes that "Cook et al, Sandhu et al, and Arami et al differ from the present invention in that they do not teach that the first plenum extends further from the processing chamber than the second plenum." Final Office Action, page 5. In support of the rejection, the Final Office Action states that:

> Ohashi et al teaches a first plenum S extends further from the processing chamber than the second plenum 719'. (Figure 7)
>
> The motivation for elongating the first plenum in the apparatus of Cook et al, Sandhu et al, and Arami et al is to provide a specific shape for the plenums as taught by Ohashi et al. Furthermore, it has been held that change in shape is a matter of choice which a person of ordinary skill in the art would have found obvious. (See In Re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) MPEP 2144.04(d)).

Final Office Action, page 5.

The Applicants respectfully submit, however, that it would not be obvious to selectively combine elements of Sandhu, Arami, and/or Ohashi into the apparatus of Cook for reasons similar to those discussed above with respect to Claim 3. In particular, it would not be obvious to somehow selectively substitute elements of Sandhu (where the wafer 206 is perpendicular to a direction of gas flow), Arami (where the wafer W is perpendicular to a direction of gas flow), and/or Ohashi (where the wafer substrate 711 is perpendicular to a direction of gas flow) for elements of the primary Cook deposition apparatus (where the wafer is parallel to a direction of gas flow). Moreover, Cook teaches away from a showerhead including a heating element therein (as recited in Claims 12 and 14) because Cook states that:

> FIG. 7 illustrates a gas injector 78 having a body 80.... Two gas fittings 84, 86 are shown, providing input for reactant gas to gas channels 88, 90. A water channel 92 is shown between the channels 88, 90 for passage of water to cool the injector 78. (Underline added.)

Cook, col. 4, lines 63-65. Cook thus teaches away from a showerhead including a heating element as recited in Claims 12 and 14.

The Final Office Action further states that:

> The variable length of the plenums in the showerhead is not significant in that the length of the plenum in the showerhead is varied as a possible embodiment. The

> Applicants disclose showerheads having the same size plenums (Figures 6-10), and showerheads with variable length plenums (Figures 11 and 12). No significant difference is noted by the Applicants.

Final Office Action, page 20. The Applicants respectfully disagree. Embodiments including plenums with different lengths are discussed, for example, with respect to Figures 11 and 12 of the present application on pages 9 and 10 thereof. For example, the present application states that: "The heating wire 260 (such as a tungsten wire) can be installed on the extended portion in the central plenum 212 to reduce heating of the side plenums 214...." Application, page 9, lines 28-30.

Accordingly, Claims 12 and 14 are patentable over the combination of Cook, Sandhu, Arami, and Ohashi.

B. Claims 12 And 14 Are Patentable Over The Combination Of Brors, Sandhu, And Ohashi

The Final Office Action concedes that "Brors et al, and Sandhu et al differ from the present invention in that they do not teach that the first plenum extends further from the processing chamber than the second plenum." Final Office Action, page 8. In support of the rejection, the Final Office Action states that:

> Ohashi et al teaches a first plenum S extends further from the processing chamber than the second plenum 719'. (Figure 7)
>
> The motivation for elongating the first plenum in the apparatus of Cook et al, Sandhu et al, and Arami et al is to provide a specific shape for the plenums as taught by Ohashi et al.

Final Office Action, page 8.

The Applicants respectfully submit, that it would not be obvious to selectively combine elements of Sandhu and/or Ohashi into the process chamber of Brors for reasons similar to those discussed above with respect to Claim 3. In particular, it would not be obvious to somehow selectively substitute elements of Sandhu (where the wafer 206 is perpendicular to a direction of gas flow) and/or Ohashi (where the wafer substrate 711 is perpendicular to a direction of gas flow) for elements of the primary Brors process chamber (where the wafers 44 are parallel to a direction of gas flow). Moreover, Brors teaches away from a showerhead including a heating element therein (as recited in Claims 12 and 14) because Brors states that:

> The flow pattern of the process gases is vital to the formation of uniform layers upon wafers 44.... Referring now to FIG. 30, process gases to be used in depositing layers on wafers 44 are provided via ducts 202 to a mixing chamber 204 which, along with a plurality of gas flow control devices 206 and a water-cooled injection plate 210, is included within gas injection manifold 200. (Underline added.)

Brors, col. 15, lines 45-54. *See also*, Brors, col. 16 lines 28-29 and 57-58. Brors thus teaches away from a showerhead including a heating element as recited in Claims 12 and 14. As discussed above, embodiments including plenums with different lengths are discussed, for example, with respect to Figures 11 and 12 of the present application, and a heating wire may be installed on the extended portion of a central plenum.

Accordingly, Claims 12 and 14 are patentable over the combination of Brors, Sandhu, and Ohashi.

C. Claims 12 And 14 Are Patentable Over The Combination Of Foehring, Sandhu, Arami, And Ohashi

The Final Office Action concedes that "Foehring et al, Sandhu et al, and Arami et al differ from the present invention in that they do not teach that the first plenum extends further from the processing chamber than the second plenum." Final Office Action, pages 13-14. In support of the rejection, the Final Office Action states that:

> Ohashi et al teaches a first plenum S extends further from the processing chamber than the second plenum 719'. (Figure 7)
>
> The motivation for elongating the first plenum in the apparatus of Foehring et al, Sandhu et al, and Arami et al is to provide a specific shape for the plenums as taught by Ohashi et al.

Final Office Action, page 14.

The Applicants respectfully submit, however, that it would not be obvious to selectively combine elements of Sandhu, Arami, and/or Ohashi into the apparatus of Foehring for reasons similar to those discussed above with respect to Claim 3. In particular, it would not be obvious to somehow selectively substitute elements of Sandhu (where the wafer 206 is perpendicular to a direction of gas flow), Arami (where the wafer W is perpendicular to a direction of gas flow), and/or Ohashi (where the wafer substrate 711 is perpendicular to a direction of gas flow) for elements of the primary Foehring apparatus (where the substrate 36 is parallel to a direction of gas flow). As discussed above, embodiments including plenums with different lengths are discussed, for example, with respect to Figures 11 and 12 of the

present application, and a heating wire may be installed on the extended portion of a central plenum.

Accordingly, Claims 12 and 14 are patentable over the combination of Foehring, Sandhu, Arami, And Ohashi.

D. Allowance Of Independent Claims 12 And 14 And Dependent Claims 13, 15, And 21-27 Is Respectfully Requested

The Applicants thus submit that Claims 12 and 14 are patentable over the cited art for at least the reasons discussed above. In addition, dependent Claims 13, 15, and 21-27 are patentable at least as per the patentability of Claims 12 and 14 from which they depend.

In support of the rejections of Claims 12 and 14, the Final Office Action has stated (on pages 5, 8, and 14) that:

> [I]t has been held that a change in shape is a matter of choice which a person of ordinary skill in the art would have found obvious. (See *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) MPEP 2144.04(d))

The Applicants respectfully submit, however, that this is a misstatement of the law and of the MPEP. In particular, the relevant portion of the MPEP states that:

> *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (The court held that the configuration of the claimed disposable plastic nursing container was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant.).

MPEP, Sec. 2144 (IV)(B). In Claims 12 and 14, relative lengths of the plenums is significant as discussed, for example, in the application (as originally filed) at pages 9 and 10.

IV. Remarks Regarding The Ryoji Patent

In the "Response to Arguments" section on page 22 of the Final Office Action, the Final Office Action states that "Ryoji et al could be used to in place of Sandhu et al in the rejections above." The Applicants have not further addressed the Ryoji patent because no outstanding rejections are based on the Ryoji patent.

CONCLUSION

Accordingly, the Applicants submit that all pending claims in the present application are in condition for allowance, and a Notice of Allowance is respectfully requested in due course. The Examiner is encouraged to contact the undersigned attorney by telephone should any additional issues need to be addressed.

Respectfully submitted,

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CERTIFICATION OF TRANSMISSION

I hereby certify that this correspondence is being transmitted electronically to the U.S. Patent and Trademark Office on January 10, 2007.

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